

## CHEMICAL AND RADIOACTIVE WASTE MANAGEMENT

### INTRODUCTION

This chapter describes Fermilab's program to manage chemical and radioactive wastes in compliance with applicable regulations and in a manner that protects human health and the environment. Fermilab generates a variety of chemical wastes. There are complex state and federal regulations governing their management. The generation, storage, transport and disposal of hazardous waste is governed by the federal Resource Conservation and Recovery Act (RCRA). Illinois has authority to regulate hazardous waste within the state, and also to regulate the transport and disposal of Special (non-RCRA) wastes. Polychlorinated biphenyls (PCBs) and asbestos are regulated by the federal Toxic Substances Control Act (TSCA) and are classified as Special Waste in the State of Illinois.

Fermilab, as a byproduct of operating its high energy physics research program, also generates low level radioactive and mixed wastes. Details of the Fermilab program for management of radioactive wastes and mixed wastes are summarized in [Article 441](#), [442](#) and [443](#) of the Fermilab Radiological Control Manual as well as the [Low Level Waste Certification Program](#) (LLWCP).

### DEFINITIONS

Listed below are a few abbreviated definitions relating to chemical waste management.

*Chemical Waste* means wastes generated at Fermilab that are regulated by federal, state or local statutes. These wastes typically include solvents, degreasers, coatings, adhesives, lubricants, coolants and various other commercial chemical products and laboratory reagents.

*Construction Coordinator* (CC) means a person specifically assigned to oversee the work of a fixed-price construction subcontract for conformance to the subcontract documents.

*Declassified waste* means a waste which has been determined pursuant to Illinois Administrative Code Section [808.245](#) to not be special waste.

*Disposal* means the discharge, deposit, injection, dumping, spilling, leaking, or placing of any waste into or on any land or water.

*Generator* means a person directly involved in the activity or process that generates a waste.

*Hazardous waste* means a waste material that exhibits the *characteristics* of hazardous waste in:

- [40 CFR 261.21](#) - Ignitability
- [40 CFR 261.22](#) - Corrosivity
- [40 CFR 261.23](#) - Reactivity or
- [40 CFR 261.24](#) - Toxicity characteristic

Or a waste material that is *listed* in:

- [40 CFR 261.31](#) - non-specific sources
- [40 CFR 261.32](#) - specific sources
- [40 CFR 261.33](#) - discarded commercial chemical products, off-specification species, container residues, and spill residues thereof.

*Mixed waste* means (for the purpose of the chapter) a waste that is both radioactive and hazardous as defined by RCRA or is a radioactive PCB waste. A material is radioactive if it does not meet Fermilab's criteria for uncontrolled release in [Article 411](#) of the Fermilab Radiological Control Manual.

*Radiological Area (RA) waste* means (for the purpose of the chapter) an area where materials could potentially become radioactive by either exposure to particle beams capable of causing activation, or by coming in contact with transferable radioactive contamination.

*Resource Conservation and Recovery Act (RCRA)* means the federal regulations enacted to establish a framework for national programs to achieve environmentally sound management of hazardous and nonhazardous wastes.

*Satellite Accumulation Area (SAA)* means an area at or near the point of waste generation where waste is temporarily stored and is under the control of the waste generator.

*Special (Illinois non-RCRA) waste* means a waste that is not hazardous as defined by RCRA, however, is an industrial process waste, pollution control waste, medical waste, asbestos waste, or PCB waste for which there are State of Illinois statutes governing their transport and disposal.

*Task Manager (TM)* means a division/section-designated individual specifically assigned to oversee and direct a work activity. Usually this term applies to individuals directing T&M subcontractors.

*Toxic Substances Control Act (TSCA)* means the federal regulations enacted to control substances determined to cause unreasonable risk to public health or the environment. Asbestos abatement and the use, storage, transport and disposal of polychlorinated biphenyls (PCBs) are included in these regulations.

*Universal waste* means hazardous wastes that are managed under the universal waste requirements of [40 CFR 273](#) including certain batteries, pesticides, thermostats and lamps.

*Used Oil* means any oil that has been refined from crude oil, or any synthetic oil, that has been used and as a result of such use is contaminated by physical or chemical impurities.

*Waste Coordinator* means a person appointed by the division/section head with the responsibilities as outlined by the Special Responsibilities section (below).

## **SPECIAL RESPONSIBILITIES**

Business Services Section shall:

- Provide a transport vehicle and driver to perform site wide pickups of chemical waste under the direction of Hazard Control Technology (HCT) Team personnel.

ES&H Section Hazard Control Technology Team shall:

- Perform routine site wide chemical waste pickups, and special pickups when required for generator compliance.
- Operate and maintain Fermilab's RCRA Part B Permitted Hazardous Waste Storage Facility and 90 day storage areas at Site 55 in compliance with applicable regulatory requirements.
- Provide annual training to division/section waste coordinators.

- Provide guidance to division/section waste coordinators on waste related issues.
- Audit division/section waste management programs with a frequency sufficient to verify their compliance with applicable requirements.
- Verify the intended waste treatment, storage and disposal facility(s) have a satisfactory regulatory compliance record prior to submitting a requisition for a chemical waste disposal contract to the Business Services Section.

Divisions/Sections shall:

- Implement a program to ensure chemical wastes are managed in compliance with applicable regulations and Fermilab policy.
- Ensure that the duties and responsibilities of the Waste Coordinator (see below) are effectively discharged. This shall be accomplished by appointing a waste coordinator and an alternate, if deemed necessary. Alternatively, with the approval of the Senior Laboratory Safety Officer, divisions/sections may arrange with the ES&H Section by a Memorandum of Agreement for ES&H personnel to perform some of these functions. Such agreements do not, however, alter the division/section's responsibility to ensure that WC duties are performed.
- All divisions and sections are responsible for implementing the Laboratory's waste minimization program set forth in Chapter [8022](#).

Division/Section Waste Coordinators shall:

- Provide and document training for waste generators. This training should be commensurate with the types and frequency of waste generated.
- Evaluate all materials to be classified as waste to determine if the materials should first be entered in the Fermilab Excess Chemical List and/or listed in the Government Supply Administration (GSA) Excess Property listing.
- Conduct and document inspections of satellite accumulation areas (SAAs) to ensure wastes are being managed in compliance with applicable requirements.
- Approve Chemical Waste Pickup Request Forms completed by waste generators and forward them to the HCT Team.
- Provide assistance in the characterization, packaging, labeling, and temporary storage of waste generated by subcontractors under their division/section's management as requested by the Task Manager/Construction Coordinator whenever such waste is ultimately to be transferred to the HCT Team for disposal.
- Act as liaison with the HCT Team on chemical waste related issues.

- In the event that chemical waste is shipped directly offsite from the point of generation, coordinate that shipment with the HCT Team.

Division/Section waste generators shall:

- Determine if their waste is a hazardous or special chemical waste.
- Package, label and store chemical waste at a SAA in compliance with applicable requirements.
- Complete and submit a Chemical Waste Pickup Request Form to their waste coordinator for waste materials that are prepared for pickup.

Task Managers and Construction Coordinators shall:

- Work directly with their Div./Sec. Chemical Waste Coordinator to insure any waste generated during projects they oversee is properly managed.

## PROCEDURES

1. Chemical wastes shall be characterized, labeled, and packaged and temporarily stored at satellite accumulation areas (SAAs) by the generator. Generator requirements at SAA waste storage areas include:
  - identify waste with the appropriate completed hazardous, special, universal, or used oil waste label,
  - ensure the container is chemically compatible with the waste collected,
  - keep containers closed except when adding or removing waste,
  - do not store hazardous wastes longer than 90 days,
  - the total volume of hazardous waste at an SAA shall not exceed 55 gallons (one quart for P listed acute hazardous waste) for longer than 3 days,
  - do not mix or combine unlike waste materials
2. To arrange for a waste pickup, the generator completes a Chemical Waste Pickup Request Form ([HWSF Form #10](#)) and submits it to the division/section waste coordinator for review and approval. The generator shall ensure that all containers are clean, properly labeled and tightly closed prior to pickup.
3. After review and approval, the waste coordinator submits the Chemical Waste Pickup Request Form to the HCT Team.
4. The HCT Team reviews forms received for completeness and accuracy and an informal effort is made to resolve any discrepancies discovered by

- contacting the waste coordinator. If the problem is not resolved, it is noted on the form, which is returned to the waste coordinator.
5. The HCT Team notifies waste coordinator of the pickup schedule and which waste is approved for pickup.
  6. Routine chemical waste pickups are conducted by the HCT Team with assistance, as necessary, from Transportation Services personnel on the first and third Wednesday of each month. Special pickups are made when necessary to maintain compliance with SAA hazardous waste volume limits.
  7. Chemical wastes are transported to the Hazardous Waste Storage Facility at Site 55 by, or under the direction of, HCT Team personnel where they are temporarily stored pending arrangements for shipment offsite for reclamation, treatment or disposal.
  8. After each waste pickup, a copy of the pickup form is returned to waste coordinators to confirm which wastes were picked up.
  9. The Technical Appendix (8021 TA) to this chapter contains additional waste management requirements, pertaining to specific wastes routinely generated at Fermilab and identifies resources available on site.

## TECHNICAL APPENDIX TO CHEMICAL AND RADIOACTIVE WASTE MANAGEMENT

### Section A. - Additional Waste Management Requirements

1. Combining Wastes
2. Radiological Area (RA) Waste
3. Generator requirements for Certain Land Disposal Restricted (LDR) waste
4. Declassified Special Waste
5. Managing Empty Containers and Drums
6. Offsite waste shipments

### Section B. - Specific Waste Stream Requirements

1. Asbestos
2. Batteries
3. Fluorescent light ballasts
4. Medical waste
5. Mixed waste
6. PCBs
7. Rags
8. Tires
9. Unknown wastes
10. Used oil
11. White Goods
12. Fluorescent and High Intensity Discharge Lamps containing mercury

### Section C. - Resources

1. Containers
2. Halogen in Oil Screening Tests

### Section A. - Additional Waste Management Requirements:

1. *Combining Wastes* - Unlike waste materials shall not be combined by the generator except for hazardous waste rags and waste oil (detailed below). It is especially important to prevent mixing nonhazardous and hazardous wastes. Combining unlike wastes may limit waste management and disposal options and increases disposal cost.



2. *Radiological Area (RA) Waste* - Waste materials that are generated, used or stored in a RA, by definition, have the potential for being activated or contaminated. The generator of RA waste or other authorized individual shall sign the "No Radioactivity Added Certification" on the Chemical Waste Pickup Request Form. This certification documents that the waste has been determined by the generator to meet Fermilab's release criteria by either process knowledge, survey or analysis.
3. *Generator Requirements for Certain Land Disposal Restricted (LDR) Waste* - Generator documentation identifying underlying constituents in certain characteristic hazardous wastes (EPA ID#s D001, D002, and D012 through D043) is required by 40 CFR 268. However, simplified rules for lab pack wastes that are incinerated and an exclusion for waste treated in a Clean Water Act permitted treatment facility eliminate this requirement for most wastes. The generator will be notified by HCT Team personnel if this certification/notification becomes necessary. When required, the generator shall complete a "LDR Waste Certification Form" (HWSF Form #8) and attach it to the Chemical Waste Pickup Request Form.
4. *Declassified Special Waste* - The IEPA regulations exclude most solid (non liquid) nonhazardous industrial process and pollution control wastes from the definition of special waste. However, declassifying special waste requires generator certification and this documentation must be maintained and made available upon request by the waste hauler or destination facility. Disposal of these declassified wastes shall be coordinated with the HCT Team.
5. *Managing Empty Containers and Drums* - Empty is defined in the regulations as "contains no liquid or solid materials which can be removed by conventional means, i.e., pouring, pumping, aspirating". Empty containers that previously held "P listed" hazardous waste require triple rinsing or shall be managed as a hazardous waste. Other empty containers with a capacity of  $\leq 5$  gallons may be discarded in a dumpster after they have been rendered unusable. Empty fiberboard and polyethylene drums of any size may be discarded in a dumpster, however, they shall be cut in half or crushed in a way that prevents reuse. Empty steel drums with a capacity of  $>5$  gallons shall be managed as waste and the generator shall identify the material previously contained in the empty drum on the Chemical Waste Pickup Request Form. Empty drums are inspected and cleaned if necessary by HCT Team, crushed, and recycled as scrap metal. Coordinate disposal of these containers with the HCT Team.
6. *Offsite Waste Shipments* - Offsite shipments of chemical waste shall be coordinated with the HCT Team to ensure regulatory compliance including:



- manifest signature/certification (by HCT Team personnel only)
- LDR Notification/Certification
- DOT compliance
- radiation survey
- transport vehicle inspection
- Fermilab approval of offsite waste storage, treatment or disposal facility(s)
- record keeping and reporting requirements

## Section B. - Specific Waste Stream Requirements

1. *Asbestos* - Consult with ES&H staff prior to beginning any task involving the handling of asbestos containing materials or asbestos waste.
2. *Batteries* - Mercury, lithium, and nickel cadmium batteries are universal waste and shall be managed accordingly. Lead acid and lead calcium batteries are exempt from regulation as hazardous waste under RCRA when recycled if the outer casing of the battery isn't damaged or leaking acid. These batteries shall either be returned to a vendor for reclamation when purchasing new batteries or, managed as a universal waste and sent for reclamation by the HCT Team. All activated batteries, including carbon dry cell batteries, are mixed waste (hazardous and radioactive). See *Mixed Waste* below for pickup instructions.
3. *Fluorescent Light Ballasts* - Many old fluorescent light ballasts contain a small PCB capacitor or PCBs in the "potting material" filler inside the ballast. Any fluorescent light ballast manufactured prior to July 1, 1978 or whose manufacture date or PCB content is not known shall be assumed to be a TSCA-regulated item and managed accordingly. The generator is responsible for making this determination. See item 6 below for more TSCA-related requirements. PCB ballasts are also special waste and must be so labeled. Ballasts that were manufactured after July 1, 1978, or that are labeled "No PCBs" will be collected by the HCT Team and recycled as a best management practice.
4. *Medical Waste* - Medical waste is a special waste and shall be collected in designated containers marked with the international biohazard symbol. These containers will be provided by the HCT Team. Containers of medical waste needles shall also be marked with the word "Sharps".
5. *Mixed Waste* - Mixed waste includes radioactive hazardous or PCB containing waste and shall be stored only at the HWSF when removed from an SAA. Mixed waste generators shall complete and submit a Hazardous/Radioactive Waste Certification and Pickup Request Form ([HCTT Form #02](#)) to the HCT Team to request a waste pickup.

6. *PCBs* - TSCA requirements pertaining to the in-service use of PCBs are addressed in [Chapter 8040.1](#). When TSCA-regulated PCB items or materials are removed from service, the items and any containers used to hold them shall be dated and receive both PCB and special waste labels. Temporary storage areas must also be labeled with the PCB Large Mark (see [40 CFR 761.45](#)). PCB waste must be moved from the point of generation to the HWSF or shipped offsite for disposal within 30 days of the out-of-service date.
7. *Rags* - Hazardous waste rags may be collected in a common container as long as the hazardous constituents are chemically compatible and each hazardous chemical constituent is identified on the containers waste label and on the Chemical Waste Pickup Request Form. The container shall be kept closed except when adding or removing waste to prevent evaporation.
8. *Tires* - Land disposal of whole tires is prohibited by State regulations. Whole tires shall not be discarded in a dumpster. Used tires should be returned for reclamation or disposal to the vendor who provides new tires.
9. *Unknown Wastes* - Occasionally materials of unknown origin may be discovered. These wastes usually result from containers found in dumpsters or containers that are unlabeled or have illegible labels. To properly manage and dispose of unknowns, the generator or waste coordinator shall conduct and document an investigation as to what the waste might be. This investigation shall include the name of persons contacted and the best theory as to what the material might be, based on the results of the investigation. A copy of the investigation shall be attached to the Chemical Waste Pickup Request Form when submitted to the HCT Team.
10. *Used Oil* - Used petroleum based lubricating oil is routinely generated from several different sources, i.e., motor oil, vacuum pump oil, compressor oil, and may be collected in a common container. RCRA includes a rebuttable presumption that states waste oil containing >1000 ppm halogen content is a hazardous waste. Because of the storage time limitation for hazardous waste at a SAA, generators and/or chemical waste coordinators shall perform a halogen screening test when the total volume of waste oil at a SAA reaches 55 gallons to verify their waste oil is not hazardous waste. Test kits will be provided by the HCT Team. Halogen screening by the generator is not required for waste oil accumulated in quantities of  $\leq 5$  gallons at a SAA. It will be screened by the HCT Team upon receipt in storage at the HWSF.

11. *White Goods* - White goods include refrigerators, ranges, water heaters, freezers, air conditioners, humidifiers and other similar domestic and large commercial appliances. White good components include "any chlorofluorocarbon refrigerant, electrical switch containing mercury, or a device that may contain PCBs in a closed system, such as a dielectric fluid for a capacitor, ballast, or other component". The generator shall remove components from white goods prior to disposing of the white goods. White goods can be disposed of through Business Services, Scrap Material Service.
12. *Fluorescent and High Intensity Discharge Lamps Containing Mercury* - Mercury containing lamps, when recycled, will be classified as a Universal Waste. Spent lamps, when removed from service, will be transported to a central location by Facilities Engineering Services Section (FESS) personnel and stored until a large enough quantity is generated to warrant recycling. Containers containing the spent lamps shall be marked or labeled with the phrase "Universal Waste Mercury-Containing Lamp(s)". Individuals other than FESS personnel who generate mercury containing lamps may request the lamps be picked up by completing a "Chemical Waste Pickup Request Form" and submitting it to the HCT Team. Residues and fragments from broken lamps must be contained and handled the same as intact lamps.

## **Section C.- Resources**

1. Containers - the following containers for collecting chemical waste are available from the HCT Team:
  - 55 gallon bung type steel drums
  - 30 gallon open head steel drums
  - 14 gallon open head poly drums
  - 55 gallon open head poly drums
  - 55 gallon open head steel drums
  - 55 gallon open head fiber drums
  - 55 gallon bung type poly drums
2. Halogen Screening Tests